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ABSTRACT

Although children are not miniature adults, they are often treated as such when participating in many youth sport activities. Young athletes, for example, are generally expected to participate in sporting events with equipment that has been designed for adults. What effect might scaling down such equipment have on the young child's performance? The purpose of this paper is to examine that question specifically as it relates to basketball. A review of the literature on the effects of modified basketball size and goal height on children's performance yields the following conclusions: (1) a decrease in the basketball size and weight appears to benefit young children with less absolute body size and strength by requiring less force to be applied when shooting or passing and improved ball control skills; and (2) a decrease in the goal height appears to benefit children's shooting accuracy. (Author/JD)

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Modifications of Basketball Equipment and Children's Performance

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Running head: YOUTH BASKETBALL

Abstract

Eventhough children are not miniature adults, they are often treated as such when participating in many youth sport activities. Young athletes, for example, are generally expected to participate in sporting events with equipment that has been designed for adults. What effect might scaling down such equipment have on the young child's performance? The purpose of this paper was to examine that question specifically as it relates to basketball. A review of the literature on the effects of modified basketball size and goal height on children's performance yields the following conclusions: (1) A decrease in the basketball size and weight appears to benifit (a) young children with less absolute body size and strength thereby requiring less force to be applied, and (b) ball control skills by increasing the hand contact with the ball; and (2) a decrease in the goal height appears to benifit children's shooting accuracy.

Modifications of Basketball Equipment and Children's Performance

The purpose of this paper is to examine the literature on two factors that may affect the basketball performance of elementary age children. Additionally, suggestions and questions that may serve to guide further study will be presented. Motor developmentalists would suggest that optimal performance on sport-related skills such as in the sport of basketball is dependent on the development of mature fundamental movement skills (Gallahue, in press). This is a particular research area that has received considerable attention. Morris (1976), Issacs (1980), and Koslow (1982) have, for example, examined ball color effects on the fundamental movement skill of catching. Ball size has also been investigated as a possible factor in such movement skills (Isaacs, 1980, Payne & Koslow, 1981, & Payne, 1982). If research suggests that these and other factors may affect children's fundamental movement skill performance, one might hypothesize that they might additionally affect more complex sport-related tasks.

Unfortunately, children's performance of such skills, specifically basketball, is a relatively unresearched area. Perhaps this is due to the vast number of individual sports skills within one sport activity, or even due to the lack

of published descriptive data of such skills. In any case, it is evident that additional study is needed.

It has long been recognized that children are smaller in absolute body size and strength than adults (Teeple, 1976). Therefore, when we ask children to use an adult sized basketball and goal, we are asking them to apply greater force to hit the same target since the ball must cover a greater distance. Children, then, are obviously at a greater disadvantage when they use equipment and rules designed for adults.

Teachers and coaches for several years have understood that children are not miniature adults, thus recognizing the need for making modifications in equipment for beginners who are at the initial stages of learning a sport-related skill. Volleyball nets have been lowered. Soccer fields have been shortened. Tennis rackets have been modified. Basketballs have been reduced in size and weight. Experts in pedogogy have also perceived the need for equipment modification, suggesting that basketball goals, for example, should be reduced in size for new learners. This perception has additionally spread to the business world with various manufacturing companies producing modified equipment. In January, 1985 for instance, Wilson Sporting Goods Company introduced their new "Rally" tennis ball which is 7% larger than the conventional ball and proported to reduce unforced errors

and enhance more consistent hitting (Lumey, 1985).

Unfortunately, many decisions regarding what and how much modification(s) should be made has been based simply on common sense. Scientific research must, however, be the building block for these decisions if optimum change is to result.

The height of the basketball goal is one issue that has been addressed by teachers and coaches frequently throughout history. As early as the 1930's suggestions were being made by Bunn (1933) to introduced a graduated goal height system (8 feet for elementary to 12 feet for college and professionals), just as the graduated length method has been introduced in the eighties for new tennis learners.

More recently, Isaacs and Karpman (1981) investigated the effects of varying basketball types and height of baskets on boys' and girls' shooting accuracy. The subjects (M age = 8.5 years) who had never been part of an organized youth basketball league were asked to shoot one of three different sized and weighted basketballs at an eight and ten feet goal. The results indicated that the effect of an eight feet verses ten feet basket is: (1) to double the odds of making the shot verses hitting the rim; (2) to increase more than double the odds of hitting the rim verses missing the shot; and (3) to increase more than five times the odds of making the shot verses missing the

shot. Both males and females had greater problems hitting the backboardless rim. Sixty-nine percent of the females and 45% of the males failed to even hit the eight feet high structure while 89% of the females and 70% of the males failed to hit the ten feet high goal.

Stinar (1981) also investigated the effects of modified and regulation basketball equipment on 9-12 year old children's shooting ability. Fifth and sixth grade boys and girls were given a pretest and posttest prior to and following a six week program. The children were measured on the foul shot and the under the basket shot from the A.A.H.P.E.R.D. basketball sport skill test. A regulation ball and a smaller ball (28 1/2") were used, along with an eight and ten feet goal. The results indicated that all subjects improved in performance but no significant main effects were discovered. Distance from the target was, however, a factor. In fact, many of the shots failed to reach the target. Therefore, eventhough this study showed no significant effects for modified equipment, some factors may have confounded the results.

The effect of changes in the weight and size of the basketball have also been of interest to some researchers. Wright (1967), for example, investigate the effects of light and heavy weighted equipment on several sport-related movement skills. The two-handed free throw was one such skill that seven and eight year old boys and girls were

asked to perform. Each group of subjects were taught the skill, then tested two days later. The results of the study were mixed. Seven year old girls performed better with the lighter weighted ball (6 ounces) while there was no significant differences for the eight year old girls. On the other hand, all boys performed best with the heavier equipment. The author suggested that certain tasks possessed a strength weighting that might explain the lower scores for the girls. Additionally, exposure to the heavier weighted equiment may have contributed to the boys' performance. Wright concludes that "learning of sports type skills by children having limited strength may be facilitated by use of lighter equipment" (p. 713).

Haywood (1978) also examined the relationship between basketball size and children's performance on such tasks. Children (9.0-12.7 years) involved in some form of youth sports program were measured on two subtests from the A.A.H.P.E.R.D. basketball skills test battery. The smaller (2"), lighter weighted (2 oz.) ball demonstrated significant effects on passing, with all age groups improving on performance. When divided into age groups younger children (under 10.5 years) also responded with more accuracy when shooting with a smaller ball. On the other hand, older children performed better with the regulation sized ball. One might question, however, the possiblity of past experience playing a role in these

results. Anthropometric measures also indicated that the mean hand spread of children on the smaller ball (27%) closely approximated that of women's (28%) and men's (31%) on a regulation sized ball. Therefore, ball handling (indicated by the passing test may be "mechanically more similar under these circumstances" (p. 5) to that of adults. The results of this study indicate that ball handling skills and shooting skills for children at least under 10.5 years may be facilitated by the use of a smaller ball.

Zankovich and Husak (1983) also investigated possible effects of reduced ball size on elementary age (5th and 6th graders) children's basketball performance. The youth sport participants were measured for shooting accuracy (free throw), speed pass and ball handling skills during an eight week time period. The subjects were divided into two groups. One week prior to the playing season both groups were measured on the smaller (women's professional) ball. On the second (fourth week of the season) and third (eighth week of the season) tests one group was measured with the small ball and one group was measure with the larger ball. The smaller ball, however, was used solely during the season. The authors reported a general trend of improved performance with the smaller ball but the only statistically significant effect was found during the fourth week on the pass and the foul shot. Thus,

eventhough all subjects performed with the smaller ball during the season, no overall difference was found.

Certain variables, such as uncontrolled practice and warm-up may have confounded the results. Additionally, eventhough all were youth sport participants, they may not have been at the same developmental level for the skills that were measured. It is important to note that successful performance in all of the previously mentioned studies was measured by the quantity, or product score, of the performance only. The quality of the movement and how ball size and goal height may affect it has yet to be investigated. In other words, will these factors produce similar results when comparing children and one developmental level of a skill to children at another level? As coaches and teachers we are rarely satisified to simply win the game by scoring the most points. Generally, we are just as interested, if not more so, in improving our athletes' skill level. Thus, as researchers we should not be satisified with looking only at the product of the performance.

In summary, the limited amount of available research tenatively points toward the following conclusions: (1) A decrease in the basketball size and weight appears to benifit (a) young children with less absolute body size and strength thereby requiring less force to be applied, and (b) ball control skills by increasing the hand contact with

the ball; and (2) a decrease in the goal height appears to benifit children's shooting accuracy.

The need for further research in this area is paramount. First, scientific research in controlled settings is necessary. Variables such as practice, warm-up and previous experiences must be recognized and controlled. Continued research on the relationship between body measures (hand size and height), equipment used and success is additionally needed. The following questions also need to be answered: (1) What is the optimum ball size/weight for performance on ALL basketball skills? (2) As players become more skilled, will changing from the lighter/smaller ball to the larger/heavier ball result in a positive transfer? and (3) When should transfer from the smaller to larger basketballs shorter and to higher goals be most effectively made? Finally, one must recognize that the studies to date have only measured quanitative performances (i.e. number of baskets scored and passes caught). For those truly interested in the developmental aspects of sport related abilities, questions regarding the effects of reduced ball size on the quality (i.e. form) of these skills must also be addressed. Bad habits in sports are often enhanced by using equipment that is too large or heavy. If the acquisition of proper form should be facilitated by scaling down equipment, the transition back to larger/taller implements should be easier to achieve.

Thus, research that investigates equipment modification effects on the process of the basketball skill movement, rather than the product is necessary. A doctoral candidate at the University of North Carolina, Greensboro (Satern, 1986) may have provided the first crucial step in doing just that. She has conducted a biomechanical analysis of the effects of varying ball size and basket eight on the shooting skills of seventh grade boys. The interrelationships of body segments at various points in the free throw will be compared when regulation and modified equipment is used. A comparison between descriptive and statistical analysis may provide vital information for determining optimal equipment modification for children's basketball performance.

Thus, eventhough the degree to which changes in equipment affect basketball related skills is yet tenable, the need for modification in sport related activites is prevelant. As Haywood (1984) suggests, the question is no longer should adaptation be made regarding equipment, rules and procedures, but by how much! These changes must certainly be justifiable and the best way to accomplish that is through continued and further scientific research.

Author Notes

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References

Bunn, J.W. (1933). A study of baskets at different heights. The Athletic Journal, 13(6), 6-7.

Gallahue, D.L. (in press). Developmental Physical Education for Today's Children. New York: Macmillan.

Haywood, K. (1984). Modifications in youth sports: A rationale and some examples in youth sport. In M.R. Weiss & Gould, D. (Eds.), Sport for children and youths, 1984 Olympic Scientific Congress, Volume 10. Champaign, IL: Human Kinetics Publishers.

Haywood, K. (1978). Children's basketball performance with regulation & junior-sized basketballs. St. Louis, MO: University of Missourt-St. Louis. (ERIC Document Reproduction Service No. ED 164 452)

Isaacs, L.D. & Karpman, M.B. (1981). Factors effecting children's basketball shooting performance: A log-linear analysis. Carnegie Research Papers, 29-32.

Isaacs, L.D. (1980). Effects of varying ball diameters on catching ability of children. Perceptual & Motor Skills, 53, 739-744.

Koslow, R.E. (1983). Reaction time as related to ball color. Perceptual & Motor Skills, 57, 871-874.

Morris, G.S.D. (1976). Effects ball & background color have upon the catching performance of elementary school children. Research Quarterly, 47(3), 409-415.

Payne, V.G. (1982). Simultaneous investigation of effects of distance of projection & object size on object reception by children in grade 1. Perceptual & Motor Skills, 54, 1183-1187.

Payne, V.G. & Koslow, R. (1981). Effects of varying ball diameters on catching ability of young children. Perceptual & Motor Skills, 54, 739-744.

Satern, M.N. (1986). The effect of ball size and basket height on the mechanics of the basketball free throw as performed by seventh grade boys. Unpublished doctoral dissertation, University of North Carolina, Greensboro.

Stinar, R.A. (1981). The effects of modified and regulation basketball equipment on the shooting ability of nine-to-twelve-year-old children. Unpublished doctoral dissertation. University of Maryland, College Park.

Teeple, J.B. (1976). Review of research in growth & motor development with implications for elementary school programs. Illinois Journal, 4-7.

Wilson Sporting Goods Company (1985). Wilson introduces 'Big' tennis ball breakthrough. (News Release No. May 7, 1985). River Grove, IL: Lumley(author).

Wright, E.J. (1967). Effects of light & heavy equipment on acquisition of sports-type skills by young children. Research Quarterly, 38(4), 705-714.

Zankovich, T.J. & Husak, W.S. (April, 1983). Differences in skill performance for children between a large & small basketball over an eight week period. Paper presented at the annual conference of the California Association for HPERD, Long Beach, California.